

What is Claimed is:

1. An article of manufacture for polishing a substrate comprising a polishing article having a polishing surface, a plurality of passages formed through the polishing article for flow of material therethrough, and a plurality of grooves disposed in the polishing surface.
2. The article of claim 1, wherein a portion of the plurality of passages intersect with a portion of the plurality of grooves on the polishing surface.
3. The article of claim 1, wherein each of the passages has a diameter of between about 16 mils and about 1/2 of an inch and are disposed between about 0.1 inches and about 1.0 inches from one another.
4. The article of claim 1, wherein the polishing article comprises a conductive material or a dielectric material having conductive elements disposed therein.
5. The article of claim 1, wherein the plurality of grooves form a pattern comprising substantially circular concentric grooves, an X-Y pattern disposed, or a triangular pattern formed on the polishing surface.
6. The article of claim 5, wherein a portion of the plurality of grooves are non-intersecting and are spaced between about 30 mils and about 300 mils apart.
7. The article of claim 1, wherein the polishing article is disposed on a sub-pad.
8. The article of claim 7, wherein the sub-pad comprises a plurality of pores disposed therein for flow of material therethrough and the plurality of pores of the sub-pad and the plurality of passages in the polishing article are aligned for flow of material through the sub-pad and the polishing article.

PATENT

Att. Dkt. AMAT/5765/CMP/CMP/RKK
Express Mail No. EV 041915785 US

9. The article of claim 1, wherein the polishing article has a center portion and a perimeter portion, the center portion having a plurality of passages.
10. The article of claim 9, wherein the outer portion of the polishing article conducts electricity to the substrate surface.
11. A method of processing a substrate, comprising:
positioning the substrate in an electrolyte solution containing a polishing article; and
polishing the substrate with a polishing article having a polishing surface, a plurality of passages formed through the polishing article for flow of material therethrough, and a plurality of grooves disposed in the polishing surface.
12. The method of claim 11, further comprising depositing a material on the substrate by an electrochemical deposition method.
13. The method of claim 12, wherein the depositing the material and the polishing the substrate are performed concurrently.
14. The method of claim 12, wherein the depositing the material is an electroplating process, an electroless process, or combinations thereof.
15. The method of claim 11, wherein the polishing article exerts a pressure on the substrate of about 2 psi or less.
16. The method of claim 11, wherein the electrolyte solution is provided under pressure.
17. The method of claim 11, wherein a portion of the plurality of passages intersect with a portion of the plurality of grooves on the polishing surface.

PATENT

Atty. Dkt. AMAT/5765/CMP/CMP/RKK

Express Mail No. EV 041915785 US

18. The method of claim 17, wherein each of the passages has a diameter of between about 16 mils and about 1/2 of an inch and are disposed between about 0.1 inches and about 1.0 inches from one another.

19. The method of claim 11, wherein the polishing article comprises a conductive material or a dielectric material having conductive elements disposed therein.

20. The method of claim 11, wherein the plurality of grooves form a pattern comprising substantially circular concentric grooves, an X-Y pattern disposed, or a triangular pattern formed on the polishing surface.

21. The method of claim 20, wherein a portion of the plurality of grooves are non-intersecting and are spaced between about 30 mils and about 300 mils apart.

22. The method of claim 11, wherein the polishing article is disposed on a sub-pad.

23. The method of claim 11, wherein the sub-pad comprises a plurality of pores disposed therein for flow of material therethrough and the plurality of pores of the sub-pad and the plurality of passages in the polishing article are aligned for flow of material through the sub-pad and the polishing article.

24. The method of claim 11, wherein the polishing article has a center portion and a perimeter portion, the center portion having a plurality of passages.

25. The method of claim 11, wherein the outer portion of the polishing article conducts electricity to the substrate surface.

26. An apparatus for depositing and planarizing a material on a substrate, comprising:

a partial enclosure defining a processing region and having a fluid inlet and a fluid outlet;

a shaft connected to the partial enclosure on one end and to an actuator on an opposing end thereof and adapted to rotate the partial enclosure;

a polishing article disposed in the partial enclosure, the polishing article having a polishing surface, a plurality of passages formed through the polishing article for flow of material therethrough, and a plurality of grooves disposed in the polishing surface;

a diffuser plate disposed in the partial enclosure and positioned below the permeable disc; and

a substrate carrier movably disposed above the permeable disc, the substrate carrier having a substrate mounting surface and a plurality of electrical contacts disposed about the perimeter of the substrate receiving surface.

27. The apparatus of claim 26, further comprising an anode disposed in the partial enclosure below the diffuser plate.

28. The apparatus of claim 26, wherein the anode is in contact with the polishing article.

29. The apparatus of claim 26, wherein the diffuser plate comprises a plurality of holes formed therein.

30. The apparatus of claim 26, further comprising a membrane disposed between the anode and permeable disk.

31. The apparatus of claim 26, wherein apparatus provides orbital motion, circular rotation, translational motion, or linear motion between the wafer and the permeable disk.

32. The apparatus of claim 26, wherein the apparatus is disposed in a processing system comprising a processing platform having two or more processing stations, a loading station and a substrate transfer device disposed above the processing

stations and the loading station, wherein the apparatus is positioned at each processing station.

33. The apparatus of claim 26, wherein a portion of the plurality of passages intersect with a portion of the plurality of grooves on the polishing surface.

34. The apparatus of claim 26, wherein each of the passages has a diameter of between about 16 mils and about 1/2 of an inch and are disposed between about 0.1 inches and about 1.0 inches from one another.

34. The apparatus of claim 26, wherein the polishing article comprises a conductive material or a dielectric material having conductive elements disposed therein.

35. The apparatus of claim 26, wherein the plurality of grooves form a pattern comprising substantially circular concentric grooves, an X-Y pattern disposed, or a triangular pattern formed on the polishing surface.

36. The apparatus of claim 35, wherein a portion of the plurality of grooves are non-intersecting and are spaced between about 30 mils and about 300 mils apart.

37. The apparatus of claim 26, wherein the polishing article has a center portion and a perimeter portion, the center portion having a plurality of passages.

38. The apparatus of claim 37, wherein the outer portion of the polishing article conducts electricity to the substrate surface.